Joint E3 Bulletin

JOINT
E3 BULLETIN

Volume 7, Issue 1
JANUARY 2003

A Publication of the
Department of Defense

In This Issue:

MIL-STD-464A APPROVED

MIL-STD-464A, "Electromagnetic Environmental Effects Requirements for Systems," was approved for publication on 19 December 2002. A summary of major changes to MIL-STD-464 that resulted in MIL-STD-464A are as follows:

(a) References to "Inter-System EMC Requirements" were re-designated as "External RF EME" requirements.

(b) External EME tables were updated and re-designated as follows:

- Table 1A: External EME for Deck Operations on Ships: Applicable to systems, including fixed and rotary wing aircraft, employed in shipboard applications and operations on the flight and weather decks.
- Table 1B: External EME for Shipboard Operations in the Main Beam of Transmitters: Applicable to systems employed in the main beam of transmitters.
- Table 1C: External EME for Space and Launch Vehicle Systems: Applicable to space and launch vehicle systems.
- Table 1D: External EME for Ground Systems: Applicable to Ground Systems
- Table 1E: External EME for Army Rotary Wing Aircraft: Applicable to Army rotary wing aircraft only.
- Table 1F: External EME For Fixed Wing Aircraft, Excluding Shipboard Operations: Applicable to fixed wing operations, excluding shipboard operations.

(c) The EMP environment is defined in MIL-STD-2169.

(d) The references were updated, and a number of industry/International documents added, particularly for lightning requirements and ESD.

(e) New unrestricted and restricted EME levels, in Table 3A, "External EME for HERO," are specified to control EMR hazards to electrically initiated devices (EIDs) in ordnance. The unrestricted EME represents the worst case levels to which the ordnance may be exposed. The restricted EME is used where personnel are interacting with the ordnance (i.e. assembly/disassembly and loading/unloading areas). MIL-HDBK-240 is referenced for HERO evaluations.

(f) The "Electronic Protection (EP)" requirement has been deleted.

(g) The TEMPEST requirements have been revised.

(h) Power line transient requirements previously applied to Army and Navy aircraft have been deleted.

(i) Specific bonding requirements on ignitable vapor protection have been added as have bandwidths for EMCON measurements.

(Continued on page 2)

Concurrently, the associated Data Item Descriptions (DIDs) listed below were approved:

DID Number	DID Title
DI-EMCS-81540A	Electromagnetic Environmental Effects (E3) Integration and Analysis Report
DI-EMCS-81541A	Electromagnetic Environmental Effects (E3) Verification Procedures
DI-EMCS-81542A	Electromagnetic Environmental Effects (E3) Verification Report

The changes harmonized many of the requirements across the Services. For example, the EMCON requirement has been adopted by the Air Force and now applies to all of the Services; unique wording on testing for p-static for the Army and Navy has been removed; and electrical bonding for mechanical interfaces (formerly EMI) is now uniform. These changes occurred because of the efforts of the Service coordinators.

MIL-STD-464A and associated DIDS are available on the JSC web site, www.jsc.mil.

Cancellation of DoD 5000-Series Publications

Deputy Secretary of Defense, Mr. Paul Wolfowitz, signed a memorandum 30 October 2002 that canceled the existing DoD Directive 5000.1, DoD Instruction 5000.2, and DoD 5000.2-R and issued interim versions of the directive and instruction.

The new DoDD 5000.1 and DoDI 5000.2, "The Defense Acquisition System" and "Operation of the Defense Acquisition System," respectively, are planned to be issued January of 2003. DoDD 5000.2-R will not be reissued but will be retained as the Interim Defense Acquisition Guidebook pending issuance of a new streamlined guidebook.

5th Annual DoD Specrtrum Summit

by CDR Kurt Ziebarth

The Joint Spectrum Center (JSC) hosted the 5th Annual DoD Spectrum Summit in Annapolis, MD last December. Key leadership from agencies regulating use of the electromagnetic (EM) spectrum and nearly 300 Spectrum Managers were in attendance to discuss challenges facing the community. National and international issues such as the impact of the global war on terrorism, homeland defense, and preparations for the World Radio Conference were the themes of this year's conference.

Highlighting the Summit were keynote speakers Rear Admiral Nancy Brown, Joint Staff, Vice Director C4 Systems, Mr. John Stenbit, Assistant Secretary of Defense (C3I) and Representative Mark Kirk, R IL. In addition, Mr Steven Price, Deputy Assistant Secretary of Defense, Spectrum, Space, Sensors C3I, chaired a National Spectrum Policy panel of distinguished leaders from the FCC, NTIA, CTIA, State Department and Congress. A key take away from the Policy Panel was the need for solidarity from the military to find a way to share spectrum with the commercial world.

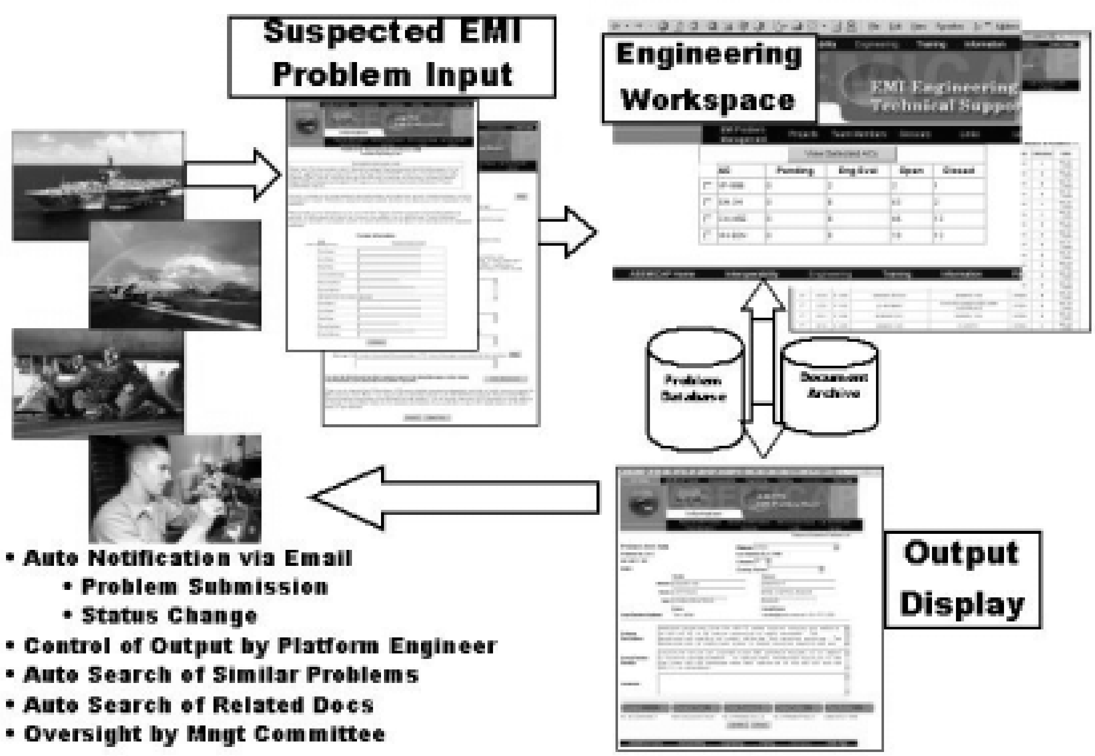
Other issues discussed at the Summit were the increasing demand for EM spectrum to support the digitized battlefield, COCOM's needs to automate the spectrum certification and supportability process, and the impact of DoD's transformation efforts on the EM spectrum community's ability to suport the future warfighter. During her speech Admiral Brown emphasized the importance of spectrum access to the warfighter stating "providing the right information, at the right time, in the right format is the key to supporting the 21st century warfighter."

Throughout the week long conference, working groups focused on automating spectrum management processes and using emerging technology to improve the DoD's efficient and effective use of the EM Spectrum. As a result of the work completed at the conference, the JSC will lead a concerted effort to automate the process that provides spectrum supportability for warfighting equipment and develop architectural standards for dynamic and autonomous EM spectrum management.

The Naval Air Systems Command Air Systems EMI Corrective Action Program (ASEMICAP) Online EMI Problem Management System

ASEMICAP's goal is to provide services and support that enable acquisition and operational personnel to understand and identify EMI issues, and to manage and resolve operational EMI problems. Our most visible effort in recent years has been EMI and ESD Awareness Training for Naval aviation squadron personnel, and the fielding of a comprehensive website (www.asemicap.net) to disseminate E3 related information. The website provides a means of communication between Fleet aviation personnel and the NAVAIR E3 engineering community. While these and other efforts are critical to our objectives, solving the Fleet's EMI problems is where the rubber meets the road. "Fixing" EMI problems leads to increased readiness and safety, and reduces operations and maintenance costs.

The goal of our Awareness Training program has been to get Fleet personnel to become more aware of EMI and its effects, and to assist NAVAIR with identifying and reporting EMI problems. With this awareness growing every year, more problems are coming to light. We are now ready to move into the next program phase: tracking reported problems to their solution and ensuring the originator is in the loop with whatever action is being taken. To handle this increase in reported problems, we have instituted a new EMI Problem Management Process at NAVAIR. Our EMI Problem Management System is an Internet based, automated system (accessible through the ASEMICAP web site) that has a variety of automated features to ensure maximum information is displayed for any given EMI problem in the database. This system and its major processes are depicted in the flow chart shown below.



Everything starts with EMI problems being reported. Once a problem is reported, the system automatically notifies responsible personnel via e-mail that an input has been received. Parties notified include the E3 systems engineer cognizant of the specific platform, the problem originator, and various management personnel at NAVAIR and NAWC Pax River. NAVAIR E3 engineers then investigate, track, and ultimately resolve reported problems with oversight provided by a management level group.

As noted in the process documentation (available on the Website in the Program Management Discussion Forum area), this management oversight group is chaired by the ASEMICAP manager and consists of senior NAVAIR E3 management, E3 engineers, appropriate PMA/Class Desk personnel,

(continued on page 4)

(continued from page 3)

and, when needed, Fleet operational representatives. The objective of the group is to provide high-level oversight of the problem resolution efforts and coordinate necessary actions and resources to provide an acceptable solution.

Practically speaking, the vast majority of system and/or platform EMI problems are corrected prior to introduction to the Fleet. There are cases, however, where problems go uncorrected due to a myriad of reasons. Some come about and are recognized when a significant change in operational scenarios occur. An example of this was seen when the SH-60B (designed and built for FFG Class ships) was subsequently deployed on CG Class ships. A number of EMI problems were noted on the CG and not on the FFG. They were eventually corrected only after they were made known to NAVAIR by Fleet personnel.

Over the years the NAVAIR E3 community has continued to develop a workable, centralized E3 information system where EMI problem information is managed so that it is current and available to help anyone who needs it. We are continuing to work on it! Our objective in designing this new problem management system is to ensure that reported problems are acted upon, that there is accountability in the process, and ultimately that problems reach a resolution through active management. This end can only be obtained through the active participation of the Fleet in reporting operational EMI problems.

For more information on ASEMICAP EMI Problem Reporting please contact Robert Smith, ASEMICAP Manager, NAVAIR 4.1.7 at (301) 342-9223/SmithRB@navair.navy.mil or Brian Farmer at (703) 864-7023/brianfarmer@starband.net.

2003 DoD Joint E3 Program Review
Phoenix, Arizona
7 - 12 April 2003

The 2003 DoD Joint Electromagnetic Environmental Effects (E3) Program Review, hosted by the Joint Spectrum Center on behave of the Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (OASD[C3I]) will be held at the Sheraton San Marcos Hotel in Phoenix, Arizona during the week of 7 – 11 April 2003. The registration fee is $260.00. Annually, the DoD Joint E3 Program Review serves as a technical information exchange forum for E3 and spectrum management issues. This years program review will feature presentations, training and various workshops for all participants to attend. Discussions will focus on issues such as the impact of emerging technology, modeling and simulation, test and evaluation, standardization, and acquisition policy. Meetings sponsored by the individual Services, the Joint Ordnance Commanders Group HERO Subcommittee, US Heads of Delegation for NATO E3 working groups, and other ad hoc meetings will be conducted.

Hotel rooms are available at the prevailing Government rate. When making reservations, ask for "DoD E3 Group" to ensure the Government rate. These rates are also effective for the weekends before and after the program review to accommodate those planning an extended visit. More detailed information regarding the program review, including, registration and hotel reservations can be obtained by visiting the JSC website, www.jsc.mil/jsce3/intro/progrev/progrev.asp. Hotel reservations can also be made by calling 1-800-528-8071.

If you would like to present a paper, please submit your abstract to George Johnson at gjohnson@alionscience.com by the 24th of January. Hope to see you there!

E3 Personality of the Quarter

Russ Latimer

Mr. Russ Latimer currently works for the Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD/C3I). Within ASD/C3I, Mr. Latimer is a staff analyst in the Office of the Deputy Assistant Secretary of Defense for Spectrum, Space, Sensors and C3 (DASD/S3C3). He is the principal representative within DASD/S3C3 for spectrum management and the DoD Joint E3 Program. Mr. Latimer is currently leading efforts to update DoD Directives for spectrum management (DoDD 4650.1) and (DoDD 3222.3). He also participates on the DoD E3 IPT.

Mr. Latimer began his career in US Air Force and has over 20 years of experience in spectrum management. He has held spectrum related positions during tours with the US Forces Korea, the US Air Force Europe, and the US European Command.

During his career, Mr. Latimer developed communication support plans for three major military operations, drafted the US European Command Spectrum Management Manual, and coordinated host nation support for many Air Force systems.

Following his Air Force career, Mr. Latimer spent five years supporting the Joint Spectrum Center and later served as a consultant to the US Special Operations Command developing a new C4ISR Architecture.

Mr. Latimer is a 1977 graduate of the Interservice Radio Frequency Management School. He holds a BSEE, an MS in Systems Management, and an MS in Information Systems Management.

MIL-HDBK-240 ISSUED

MIL-HDBK-240, "Hazards of Electromagnetic Radiation to Ordnance (HERO) Test Guide", was published 1 November 2002. Copies of the handbook can be downloaded from the JSC website: www.jsc.mil. On the home page, select "E3 Engineering Support (J5)" and then "EMC E3/SM Library."

The handbook provides recommended practices for conducting Hazards of Electromagnetic Radiation to Ordnance (HERO) evaluations. Developed over many years by DoD test activities, the methods and procedures described therein are the product of the collective DoD HERO test experience of the Services. The handbook consolidates these practices into a single document vice numerous individual Service standards, instructions, and so forth, thus promoting a standardized approach for HERO testing.

The handbook supplements MIL-STD-464A by providing testing guidance for verification of the HERO requirements in that standard.

The handbook has four broad objectives:

- Document HERO Tri-Service test methodology,
- Promote test standardization,
- Identify alternative techniques and instrumentation, and
- Facilitate the exchange of HERO test data.

Ultimately, the HERO test data are used to determine the maximum allowable environment (MAE) for ordnance and weapon systems containing electrically initiated devices (EIDs). The MAE information is used to assess HERO risks and develop effective control measures to minimize those risks.

21ST CENTURY LIGHTNING PROTECTION FOR ENVIRONMENTS CONTAINING SENSITIVE ELECTRONICS, EXPLOSIVES, AND VOLATILE SUBSTANCES

by Richard Kithil, President & CEO
National Lightning Safety Institute (NLSI)

1. ABSTRACT.
Franklin's 1752 lightning protection invention consisted of a rod in the air, one in the ground and a connecting conductor. This "conventional wisdom" today is helpful for fire protection in cases of direct flashes to ordinary structures. For more complex facilities, where electrical systems/electronics or explosives or volatile substances are present, the 248 year old design is questionable. This paper addresses the need for a modern, kightning safety planning process that can be applied to contemporary environments.

2. BACKGROUND.
The US Department of Defense records 75 lightning-induced explosions in its database over the 1926-1999 period (DDESB archives). The US Department of Energy has recorded 346 known lightning events to its facilities during the 1990-2000 period (DOE-ORPS archives). In total, lightning is responsible for about $4-5 billion in annual losses in the USA (National Lightning Safety Institute, 1999). It is a prudent organizational policy to analyze facilities and operations to identify lightning vulnerability. Designs and operational means to deflect potential accidents should be developed. For the lightning hazard, safety should be the prevailing directive.

3. LIGHTNING CHARACTERISTICS.
3.1. Physics of Lightning. Lightning's characteristics include current levels approaching 300 kA with the 50% average being about 20kA, temperatures to 15,000 C, and voltages in the hundreds of millions. The phenomenology of lightning flashes to earth, as presently understood, follows an approximate behavior: the downward Leader (gas plasma channel) from a thundercloud pulses toward earth. Ground-based air terminators such as fences, trees, blades of grass, corners of buildings, people, lightning rods, power poles etc., etc. emit varying degrees of induced electric activity. They may respond at breakdown voltage by forming upward Streamers. In this intensified local field some Leader(s) likely will connect with some Streamer(s). Then, the "switch" is closed and the current flows. Lightning flashes to ground are the result. A series of return strokes follow.

3.2 Lightning effects. When lightning strikes an asset, facility or structure (AFS) return-stroke current will divide up among all parallel conductive paths between attachment point and earth. Division of current will be inversely proportional to the path impedance, Z (Z = R + XL, resistance plus inductive reactance). The resistance term will be low assuming effectively bonded metallic conductors. The inductance, and related inductive reactance, presented to the total return stroke current will be determined by the combination of all the individual inductive paths in parallel. Essentially lightning is a current source. A given stroke will contain a given amount of charge (coulombs = amp/seconds) that must be neutralized during the discharge process. If the return stroke current is 50kA – that is the magnitude of the current that will flow, whether it flows through one ohm or 1000 ohms. Therefore, achieving the lowest possible impedance serves to minimize the transient voltage developed across the path through which the current is flowing [$e(t) = I(t)R + L\,di/dt$].

4. LIGHTNING PROTECTION DESIGNS.
Mitigation of lightning consequences can be achieved by the use of a detailed systems approach, described below in general terms.

4.1 Air Terminals. Since Franklin's day lightning rods have been installed upon ordinary structures as sacrificial attachment points, intending to conduct direct flashes to earth. Such rods should not be located on explosives storage structures. This *integral air terminal design* does not provide protection for electronics, explosives, or people inside modern structures. Inductive and capacitive coupling from lightning-energized conductors can result in significant voltages and currents on interior power and signal conductors. Overhead shield wires and mast systems located above or next to the structure are suggested alternatives in many circumstances. These are termed *indirect air terminal designs*. Such methods presume to collect lightning above or away from the sensitive structure, thus avoiding or reducing flashover attachment of unwanted currents and voltages to the facility and equipments.

(continued on page 7)

(continued from 6)

Unconventional air terminal designs which claim the elimination or redirecting of lightning (charge dissipators) or lightning preferential capture (early streamer emitters - ESE) have received a very skeptical reception (NASA/Navy Tall Tower Study; 1975, R.H. Golde "Lightning" 1977; FAA Airport Study 1989; T. Horvath "Computation of Lightning Protection" 1991; D. MacKerras et al, IEE Proc-Sci Meas. Technol, V. 144, No. 1 1997; National Lightning Safety Institute "Royal Thai Air Force Study" 1997; A. Mousa "IEEE Trans. Power Delivery, V. 13, No. 4 1998). Merits of radioactive air terminals have been investigated and dismissed by reputable scientists (Golde, 1977).

4.2 Downconductors. Downconductor pathways should be installed outside of the structure. Rigid strap is preferred to flexible cable due to inductance advantages. Conductors should not be painted, since this will increase impedance. Gradual bends always should be employed to avoid flashover problems. Building structural steel also may be used in place of downconductors where practical as a beneficial subsystem emulating the quasi-Faraday Cage concept.

4.3 Bonding assures that unrelated conductive objects are at the same electrical potential. Without Bonding, lightning protection will not work. All metallic conductors entering structures (ex. AC power lines, gas and water pipes, data and signal lines, HVAC ducting, conduits and piping, railroad tracks, overhead bridge cranes, roll up doors, personnel metal door frames, hand railings, etc.) should be electrically referenced to the same ground. Connector bonding should be exothermal and not mechanical wherever possible, especially in below-grade locations. Mechanical bonds are subject to corrosion and physical damage. HVAC vents that penetrate one structure from another should not be ignored as they may become troublesome electrical pathways. Frequent inspection and resistance measuring (maximum 1 milliohm per Fed. Aviation Admin.) of connectors to assure continuity is recommended.

4.4 Grounding. The grounding system must address low earth impedance as well as low resistance. A spectral study of lightning's typical impulse reveals both a high and a low frequency content. The grounding system appears to the lightning impulse as a transmission line where wave propagation theory applies. A considerable part of lightning's current responds horizontally when striking the ground: it is estimated that less than 15% of it penetrates the earth. As a result, low resistance values (25 ohms per NEC) are less important that volumetric efficiencies.

Equipotential grounding is achieved when all equipment within the structure(s) are referenced to a master bus bar which in turn is bonded to the external grounding system. Earth loops and consequential differential rise times must be avoided. The grounding system should be designed to reduce AC impedance and DC resistance. The use of counterpoise or "crow's foot" radial techniques can lower impedance as they allow lightning energy to diverge as each buried conductor shares voltage gradients. Buried ground rings connected around structures are useful. Proper use of concrete footing and foundations (Ufer grounds) increase volume. Where high resistance soils or poor moisture content or absence of salts or freezing temperatures are present, treatment of soils with carbon, Coke Breeze, concrete, natural salts or other low resistance additives may be useful.

4.5 Corrosion and cathodic reactance issues should be considered during the site analysis phase. Where incompatible materials are joined, suitable bi-metallic connectors should be adopted. Joining of aluminum down conductors together with copper ground wires is a typical error.

4.6 Transients and Surges. Ordinary fuses and circuit breakers are not capable of dealing with lightning-induced transients. Surge protection devices (SPDs aka transient limiters) may shunt current, block energy from traveling down the wire, filter certain frequencies, clamp voltage levels, or perform a combination of these tasks. Voltage clamping devices capable of handling extremely high amperages of the surge, as well as reducing the extremely fast rising edge (dv/dt and di/dt) of the transient are recommended.

Protecting the AC power main panel and protecting all relevant secondary distribution panels and protecting all valuable plug-in devices such as process control instrumentation, computers, printers, fire alarms, data recording & SCADA equipment, etc. is suggested. Protecting incoming and outgoing data and signal lines (modem, LAN, etc.) is essential. All electrical devices which serve the primary asset such as well heads, remote security alarms, CCTV cameras, high mast lighting, etc. should be included.

(continued on page 8)

(continued from page 7)

SPDs should be installed with short lead lengths to their respective panels. Under fast rise time conditions, cable inductance becomes important and high transient voltages can be developed across long leads. SPDs with replacable internal modules are suggested.

In all instances the use high quality, high speed, self-diagnosing SPD components is suggested. They may incorporate spark gap, diverters, metal oxide varistors, gas tube arrestors, silicon avalanche diodes, or other technologies. Avoid SPDs with internal potting compounds. Hybrid devices, using a combination of these techniques, are preferred. SPDs conforming to the European CE mark are tested to a 10 X 350 us waveform, while those tested to IEEE and UL standards only meet a 8 X 20 us waveform. It is suggested that SPD requirements and specifications conform to the CE mark, as well as ISO 9000-9001 series quality control standards.

Uninterrupted Power Supplies (UPSs) provide battery backup in cases of power quality anomalies…brownouts, capacitor bank switching, outages, lightning, etc. UPSs are employed as back-up or temporary power supplies. They should not be used in place of dedicated SPD devices. Correct Category A installation configuration is: AC wall outlet to SPD to UPS to equipment.

4.7 Detection. Lightning detectors, available at differing costs and technologies, are useful to provide early warning. Users should beware of over-confidence in detection equipment. It is not perfect and it does not always acquire all lightning data. Detectors cannot “predict” lightning. An interesting application is their use to disconnect from AC line power and to engage standby power, before the arrival of lightning. A notification system of radios, sirens, loudspeakers or other means should be coupled with the detector. See the NLSI WWW site for a more detailed treatment of detectors. A Lightning Safety Policy should be a part of every site’s overall safety plan.

4.8 Testing & Maintenance. Modern diagnostic testing is available to “verify” the performance of lightning conducting devices as well as to indicate the general route of lightning through structures. With such techniques, lightning paths can be forecast reliably. Sensors which register lightning current attachments can be fastened to downconductors. Regular physical inspections and testing should be a part of an established preventive maintenance program. Failure to maintain any lightning protection system may render it ineffective.

5. CODES AND STANDARDS.
In the USA there is no single lightning safety code or standard providing comprehensive assistance. The most commonly-referenced USA commercial lightning protection installation standard is incomplete, out-dated, and largely pre-empted by commercial interests. US Government lightning protection documents should be consulted. The Federal Aviation Administration FAA-STD-019d is valuable. Other recommended federal codes include military documents MIL HDBK 419A, Navy NAVSE OP5, NASA STD E0012E, MIL STD 188-124B, MIL STD 1542B, MIL B 5087B, Army PAM 385-64 and USAF AFI 32-1065. The British Code BS 6551 is helpful. The new German lightning protection standard for nuclear power plants KTA 2206 places special emphasis on the coupling of overvoltages at instrument and control cables. The European International Electro-Technical Commission IEC 61024 series for lightning protection is the single best reference document for the lightning protection engineer. Adopted by many countries, IEC 61024 is a science-based document applicable to many design situations. Ignored in most Codes is the very essential electromagnetic compatibility (EMC) subject, especially important for explosives safety and facilities containing electronics, VSDs, PLCs, and monitoring equipment.

6. CONCLUSION.
Lightning has its own agenda and may cause damage despite application of best efforts. Any comprehensive approach for protection should be site-specific to attain maximum efficiencies. In order to mitigate the hazard, systematic attention to details of grounding, bonding, shielding, air terminals, surge protection devices, detection & notification, personnel education, maintenance, and employment of risk management principles is recommended.

Note: Readers have NLSI permission to copy and to re-print this paper all or in part. Please credit NLSI as the original author. The National Lightning Safety Institute is a non-profit, non-product independent organization providing objective information about lightning safety issues. See the Website at: www.lightningsafety.com

CALENDAR

ATTENTION READERS

Send articles or dates of upcoming meetings, symposium, or E3 related events to the Joint E3 Bulletin, c/o Ms. Mary Grieco, ALION Science and Technology, 185 Admiral Cochrane Drive, Annapolis, MD 21402. (410) 573-7158. Fax (410) 573-7149. E-mail; mgrieco@alionscience.com.

2003

January 21 - 23 2003
2003 MISSILE DEFENSE-SENSORS, ENVIRONMENTS AND ALGORITHMS (MD-SEA)
2003 at King Hall
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Monterey, CA
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February 18 - 20 2003
2003 15TH INTERNATIONAL ZURICH SYMPOSIUM & EXHIBITION ON ELECTROMAGNETIC COMPATIBILITY
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April 1 - 3 2003
2003 MEETING OF THE MILITARY SENSING SYMPOSIA (MSS) SPECIALITY GROUP ON INFRARED COUNTERMEASURES
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www.conted.gatech.edu/courses/defense_electronics/ew-103.hmtl

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2004

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Joint E3 Bulletin Material Wanted

The Joint E3 Bulletin covers events and information of interest to the DoD E3 community. The Bulletin includes technical articles, features on E3 personnel, announcements of E3 standards activities, notes and full text articles on related policy, and much more.

Articles and other relevant E3 material are now being solicited for publication in the Joint E3 Bulletin. The articles may be related to the topics described above or they may be, for example, descriptions of problems, requests for technical data or information, interesting observations of E3 phenomena, E3 events or announcements, or any other articles of interest. All articles submitted material must be unclassified and unrestricted.